

THE INVENTION CLAIMED IS:

1. An apparatus for detecting substrates,  
comprising:

5 a transmitter/receiver unit adapted to transmit a  
light beam through a substrate located within a transfer  
chamber;

a reflector adapted to receive the light beam  
transmitted from the transmitter/receiver unit and to reflect  
the transmitted light beam toward the transmitter/receiver  
10 unit; and

a controller coupled to the transmitter/receiver unit  
and adapted to determine whether a substrate is positioned  
between the transmitter/receiver unit and the reflector based  
on an intensity of the reflected light beam received by the  
15 transmitter/receiver unit;

wherein at least one of the transmitted and reflected  
light beams is adapted to strike a substrate positioned between  
the transmitter/receiver unit and the reflector with non-normal  
incidence.

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2. The apparatus of claim 1 wherein the  
transmitter/receiver unit and the reflector are both angled  
relative to a path of a substrate that travels through the  
transfer chamber so that both the transmitted and reflected  
25 light beams strike the substrate with non-normal incidence.

3. The apparatus of claim 1 wherein the transmitted  
and reflected light beams are adapted to strike a substrate  
positioned between the transmitter/receiver unit and the  
30 reflector at an angle of between about 2 to 6 degrees from  
normal incidence.

4. The apparatus of claim 3 wherein the transmitted and reflected light beams are adapted to strike a substrate positioned between the transmitter/receiver unit and the reflector at an angle of about 3.8 degrees from normal incidence.

5. The apparatus of claim 1 wherein the transmitted and reflected light beams are approximately parallel.

6. The apparatus of claim 1 further comprising a plurality of transmitter/receiver unit and reflector pairs, each having transmitted and reflected light beams adapted to strike a substrate positioned between the transmitter/receiver unit and reflector pair with non-normal incidence.

7. An apparatus for detecting substrates, comprising:

a transfer chamber adapted to couple to at least one processing chamber and at least one load lock chamber;

a transmitter/receiver unit adapted to transmit a light beam through a substrate located within the transfer chamber;

a reflector adapted to receive the light beam transmitted from the transmitter/receiver unit and to reflect the transmitted light beam toward the transmitter/receiver unit; and

a controller coupled to the transmitter/receiver unit and adapted to determine whether a substrate is positioned between the transmitter/receiver unit and the reflector based on an intensity of the reflected light beam received by the transmitter/receiver unit;

wherein both the transmitted and reflected light beams are adapted to strike a substrate positioned between the

transmitter/receiver unit and the reflector with non-normal incidence.

8. The apparatus of claim 7 wherein the  
5 transmitter/receiver unit and the reflector are both angled relative to a path of a substrate that travels through the transfer chamber so that both the transmitted and reflected light beams strike the substrate with non-normal incidence.

10 9. A method of detecting a substrate within a chamber comprising:  
transmitting a light beam through the substrate;  
reflecting the light beam back through the  
substrate;  
15 detecting an intensity of the reflected light beam; and  
determining whether the substrate is located within the chamber based on the intensity of the reflected light beam;  
20 wherein at least one of the transmitted and reflected light beams strikes the substrate with non-normal incidence.

10. The method of claim 9 wherein the transmitted  
25 and reflected light beams are approximately parallel.

11. A method of detecting a substrate within a chamber comprising:  
transmitting a light beam through the substrate  
30 with non-normal incidence;  
reflecting the light beam back through the substrate with non-normal incidence;

detecting an intensity of the reflected light  
beam; and

determining whether the substrate is located  
within the chamber based on the intensity of the reflected  
5 light beam.

12. The method of claim 11 wherein the transmitted  
and reflected light beams strike the substrate at an angle of  
between about 2 to 6 degrees from normal incidence.

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13. The method of claim 12 wherein the transmitted  
and reflected light beams strike the substrate at an angle of  
about 3.8 degrees from normal incidence.

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14. The method of claim 11 wherein the transmitted  
and reflected light beams are approximately parallel.